

**Tennessee Technological University
Mathematics Department**

MATH 6810: Partial Differential Equations

I. COURSE DESCRIPTION FROM CATALOG:

First and Second order PDE's, wave, heat, and Laplace's equations, applications to boundary and eigenvalue problems of mathematics, physics and engineering. Lec. 3. Cr. 3.

II. PREREQUISITE(S):

Consent of instructor

III. COURSE OBJECTIVE(S):

To study methods of solving analytic solutions to PDE's. Applications of PDE's are also included.

IV. STUDENT LEARNING OUTCOMES:

Students learn equations modeling various researches and learn the mathematical way to classify them. Students learn how to use change of variables to convert linear PDE's of 2nd order into their canonical forms. Students will learn that the approaches of solving elliptic, parabolic, and hyperbolic type PDE's are quite different since the method of separation of variables is not always possible. Upon successfully completion the course, students will be able to apply techniques learned to solve problems in their researches.

V. TOPICS TO BE COVERED:

- The single First Order Equations
- The Cauchy Problem
- Solution Generated as Envelopes

- Hyperbolic Equations
- Characteristics for Hyperbolic Equations
- The one-dimensional Wave Equations

- Laplace Equations
- Green Identity, Fundamental Solutions
- The Maximum Principle
- The Dirichlet Problem, Green's Function and Poisson Formula
- Solution of Dirichlet Problem by Hilbert Space Methods

- Parabolic Equations
- Maximum principle
- Uniqueness
- Regularity

VI. ADDITIONAL INFORMATION:

VII. POSSIBLE TEXTS AND REFERENCES:

Partial Differential Equations, An Introduction, by Walter A. Strauss.

Partial Differential Equations, Theory and Technique, 2nd edition, by George f. Carrier & Carl E. Pearson.

An Introduction to Partial Differential Equations by Pinchover & Rubinstein

Partial Differential Equations, 4th edition, by Fritz John

VIII. ANY TECHNOLOGY THAT MAY BE USED:

IX. STUDENT ACADEMIC MISCONDUCT POLICY

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy 217 – Student Academic Misconduct at [Policy Central](#).

X. DISABILITY ACCOMMODATION

Students with a disability requiring accommodations should contact the Accessible Education Center (AEC). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The AEC is located in the Roaden University Center, Room 112; phone 931-372-6119. For details, view the Tennessee Tech's Policy 340 – [Services for Students with Disabilities at Policy Central](#).